

# Ultra-Lightweight Self-Deployable SMP Nanocomposite Sandwich for Habitat Applications, Phase I

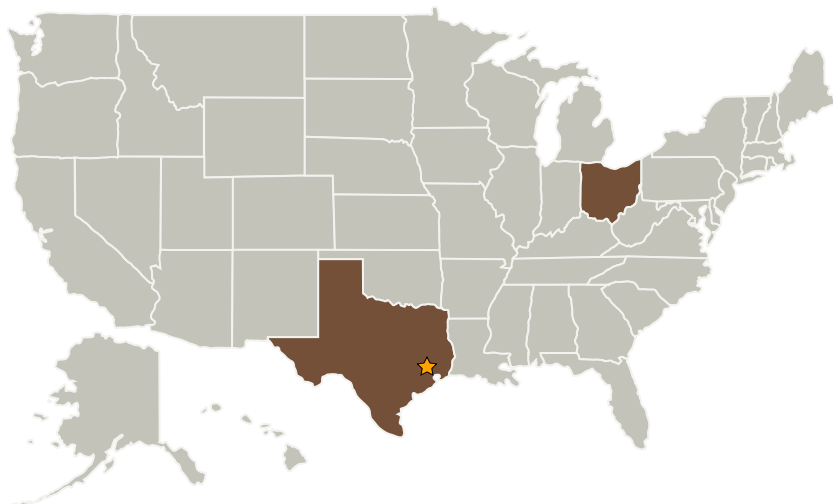
Completed Technology Project (2006 - 2006)



## Project Introduction

Space deployable and rigidizable structures that are ultra-lightweight, and have gas barrier property, space durability, and high impact resistance are desirable to improve the reliability and launching cost of space habitat structures. Some of the components currently in use such as shelters or habitats use double-wall thick films with high internal pressure. All these hollow components are vulnerable in space because of the debris and meteorites that can strike them. They will lose their functions if hit and damaged by foreign objects. These structures typically rely upon electro-mechanical mechanisms and devices for deployment and maintaining them in space for operation, which occupy over 90% of the total mass budget in many cases. In this Phase I project, we propose to develop ultra-lightweight, self-deployable microcellular foamed sandwich structures from nanocomposite shape memory polymers (SMP) and CHEM deployed technique as structural components of space habitats. Such a structural module can be compacted into a very small volume to facilitate launching. The deployment energy is the heat from the sun. This concept greatly simplifies the entire operation, reduction in weight and cost, and improves reliability. They also feature great impact resistant. Foams processed by the conventional chemical-blowing agent have toxicity problems. Our microcellular SMP foamed sandwich structures do not involve any toxicity and will have higher mechanical properties than those processed by the conventional techniques. They can be used to replace or supplement to the inflatable technology.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Johnson Space Center (JSC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Wright Materials Research Co.	Supporting Organization	Industry	Beavercreek, Ohio

## Primary U.S. Work Locations

Ohio	Texas
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX13 Ground, Test, and Surface Systems
  - └ TX13.4 Mission Success Technologies
    - └ TX13.4.6 Ground Analogs for Space/Surface Systems